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PROGRAM PLAN - DoD SOFTWARE REUSE

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CIM Executive Agent For Software Reuse
U.S. Army RAPID Project

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SECTION 1 INTRODUCTION

This program plan describes the activities, milestones, organization and resources required to establish quickly and efficiently a DoD Software Reuse capability to share the development, maintenance and use of reusable software components (RSC) across all services. The program described herein implements the Army's assigned mission as the DoD Executive Agent for Software Reuse, and will be executed under the guidance of DoD's Corporate Information Management (CIM) Program.

This program is based upon the Army's Reusable Ada Products for Information Systems Development (RAPID) Project. It takes advantage of RAPID successes through the initial use of existing RAPID program concepts, procedures and tools and builds upon already established Army, Air Force and Navy (to include Marines) "RAPID" Centers. The program evolves in three phases over a five year period. Program Phases are as follows:

Phase I	Preparation (3 Months)
Phase II	Implementation & Initial Operation (9 Months)
Phase III	Sustainment/Expansion (48 Months)

The program initially will focus its generic architecture and reusable components work upon the Management Information Systems (MIS) domain. However, reuse tools, methods and procedures work will focus on being applicable to all domains.

Section 2 describes the program's approach.

Section 3 outlines major program tasks.

Section 4 presents an organization chart and description of the required program staffing.

Section 5 contains key milestones and activities.

Section 6 contains a summary of required funding.

SECTION 2
PROGRAM DESCRIPTION

The program will create within each service and the Defense Logistics Agency (DLA) a Reuse Center modeled after the Army's RAPID Center (see Figure 1).

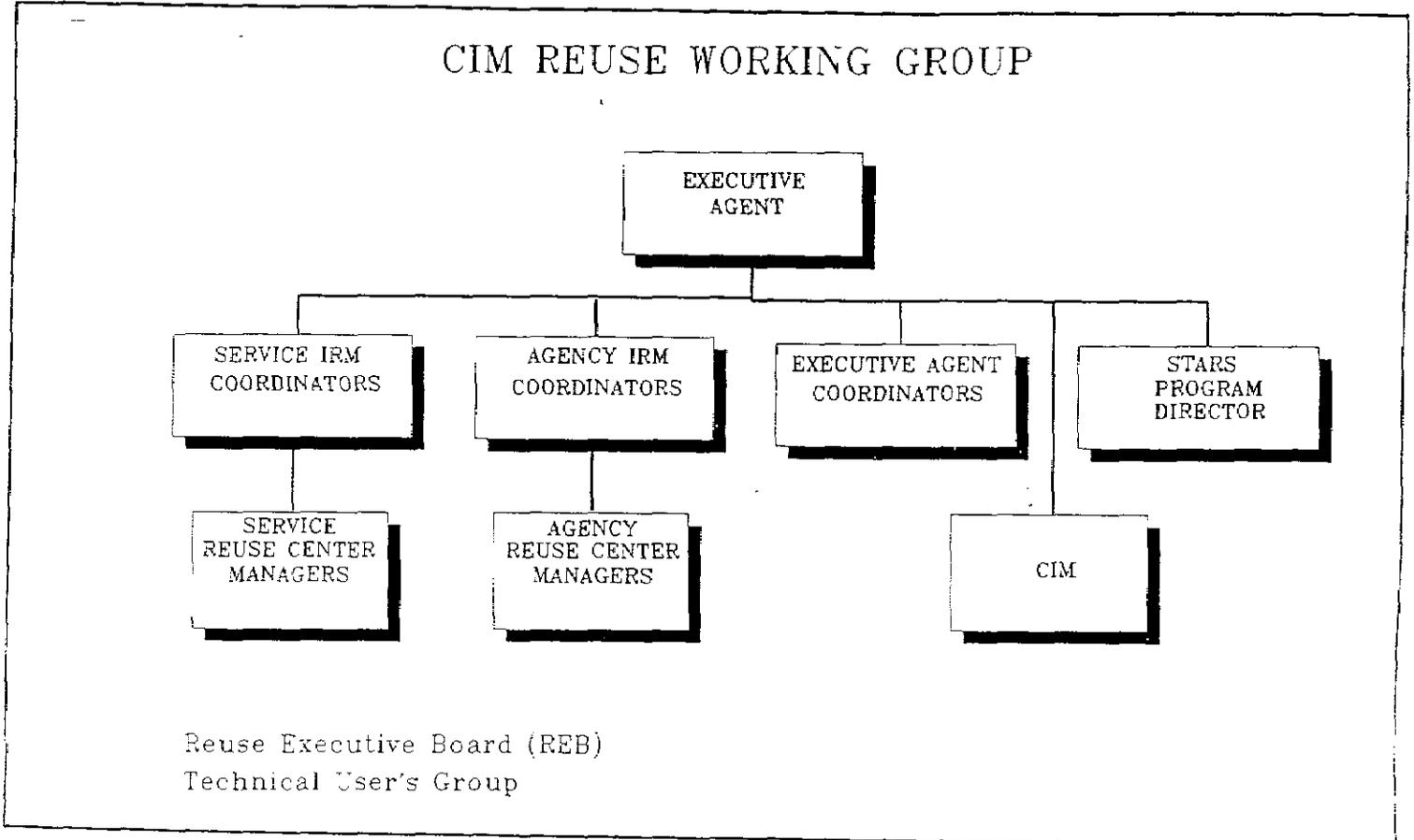


Figure 1. The RAPID Center.

The Army's Rapid Center already is established in Falls Church, VA, as are the Navy and Air Force sites at the Naval Computer and Telecommunications Station, Washington and the Standard Systems Center, Gunter AFB Montgomery, AL respectively (NOTE: A Marine Corps site is being coordinated at Quantico, VA). The existence of these sites will result in quick program start-up and significant cost avoidance at the program's outset.

A central Executive Agent (EA) site, established in the Washington, D.C. area, will serve as the coordinating element for all service sites and will represent the initial DoD "Software Warehouse" (see Figure 2). The DoD Software Warehouse library will contain the

aggregated contents of the DLA and the four service libraries and will make those reusable components universally accessible to DoD elements and their supporting contractors. Reuse center staffs at the DLA and service libraries will develop and certify components for submission to the central DoD Software Warehouse repository. These RSCs will be held locally until they are ready for submission. Copies of the RSC master catalog (with evaluation data) will be provided each reuse center on a periodic basis. This RSC catalog will be searched locally, and selected RSCs will be extracted from the central warehouse repository. This configuration supports quick local identification of required components, while preserving strong configuration management and quality assurance of RSCs, and reducing demands on the central warehouse CPU and access lines.

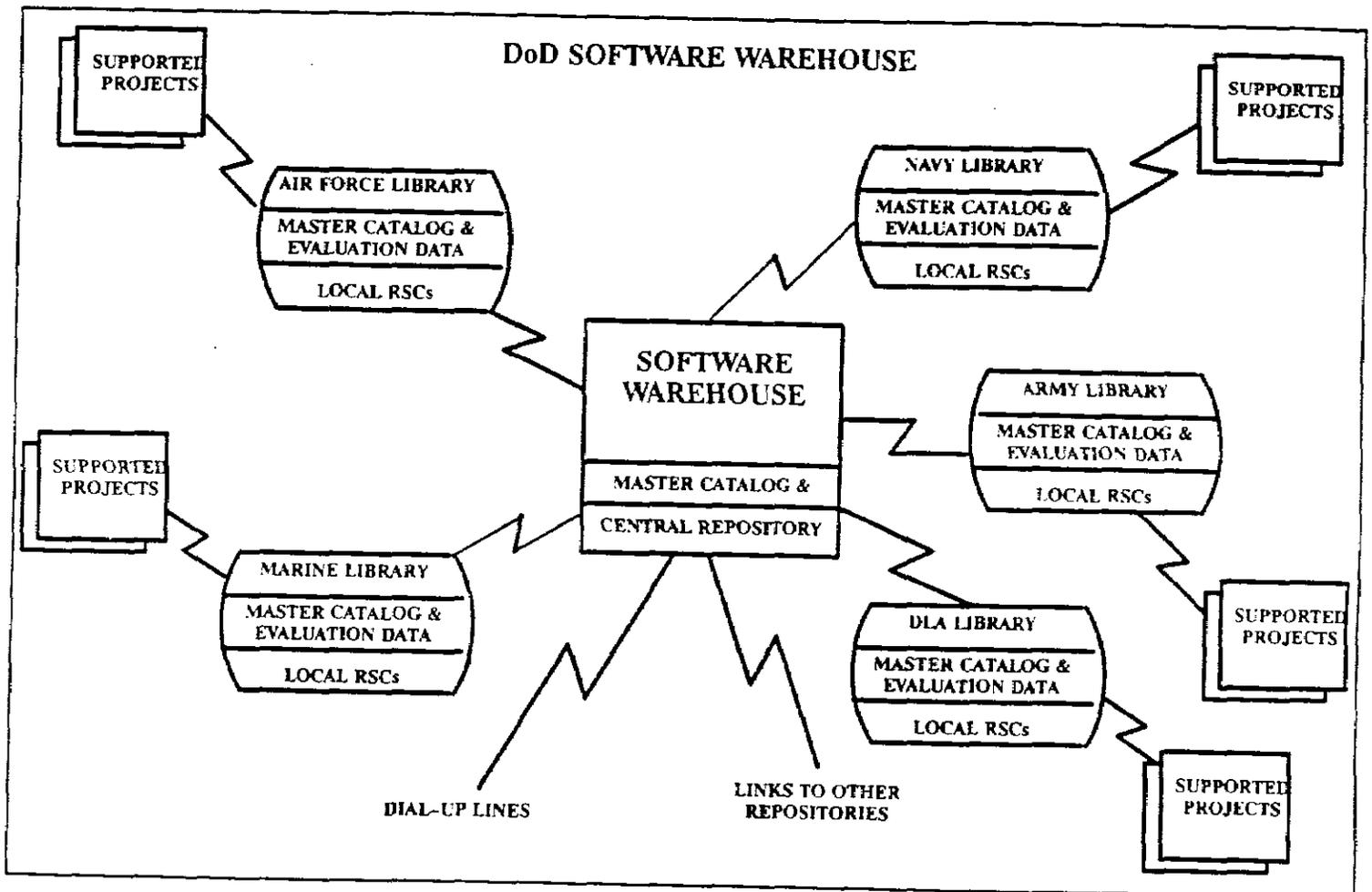


Figure 2. CIM DoD Library

From the beginning, each service Reuse Center will be provided with an automated reuse library system; reuse procedures, guidelines & standards; an initial set of Reusable Software Components (RSCs) (to include appropriate licenses for commercial RSCs); on-site contractor assistance with domain analysis, certification and reuse techniques; a series of reuse training classes; and PC-based automated library systems for supported projects. While the contents of all service sites are used to create the DoD Software Warehouse, separately each Reuse Center will be a focal point for reuse activities within that service. The advantage of the EA oversight function is insurance that these sites will develop, certify and classify components consistently while avoiding duplication of effort and development of redundant components.

The EA staff will provide a variety of coordination services, to include, at a minimum:

- (a) the issuance and refinement of standard reuse procedures and guidelines;
- (b) the periodic assembly and distribution of a RSC Catalog describing the contents of the DoD Software Warehouse. This catalog can be in both paper format and in the form of a magnetic media update to library databases located within each of the four services and DLA reuse centers.
- (c) the continuing update and distribution of a standard classification scheme for Library RSCs;
- (d) the maintenance and refinement of automated tools and methods supporting the service and DLA Reuse Centers;
- (e) the evaluation and coordination of the four services' and DLA domain analysis activities to create consolidated generic architectures and preclude population of libraries with redundant RSCs.
- (f) review and validation of the four services' and DLA certification of reusable software components being placed in their libraries/donated to the DoD Software Warehouse.

As each organization's Reuse Center matures, it will play a stronger role in determining the direction, shape and velocity of that organization's reuse program. However, the EA, via the CIM Reuse Working Groups (RWG) will continue to facilitate coordinated reuse efforts and prevent redundancy. (See Figure 3).

The CIM RWG will be formed at the outset of the program and will serve as a coordinating element for the CIM Reuse Program. As the program manager, the EA will chair the RWG, and be responsible for guiding the evolution of CIM reuse policies and implementing procedures.

Each DoD component will designate a Washington DC area IRM staff office as the responsible coordinating element for reuse activities, and a representative of that staff office will be appointed as a member of the CIM RWG. A second representative, the manager of each organization's Reuse Center, also will be a RWG member. The STARS Program Manager and the Army's Data Management Executive Agent also will be invited to participate as members of the RWG to ensure consistent, complementary, non-duplicative reuse efforts within the DoD.

Figure 3. CIM Reuse Working Groups

The following paragraphs briefly describe activities in each phase of the program:

PHASE I: Preparation (3 Months)

During this phase:

- (a) A detailed Program Implementation Plan will be developed and published;
- (b) RWG representatives will be designated;
- (c) The EA will finalize and assign EA staff responsibilities.
- (d) Coordination with initial Reuse Center sites will be finalized;
- (e) Final configurations of hardware, software and reuse support materials will be prepared for Reuse Centers;
- (f) Initial domain analysis activities will begin to identify reuse opportunities and targets within and across services. (This activity will provide initial focus and also preclude duplication of effort).

PHASE II: Implementation & Initial Operation (9 months)

During this phase:

- (a) Initial Reuse Centers will be established and staffed with an initial recommended contingent of eight persons (4:4 ratio in-house/contractor mix of 1 Center Manager, 1 System Administrator/Librarian, 4 Software Engineers, and 2 Systems Analysts). Implementation of each Reuse Center will include:
 - 1. Installation of the RAPID Center Library (RCL) system to include required hardware and system software licenses;
 - 2. All supporting Reuse Center procedures and guidelines documents;
 - 3. The RAPID RCL database containing the current component population (accompanied by licenses for commercial software components: EVB/Grace and Booch components);

4. Training for the Reuse Center's RCL System Administrator/Librarian;
 5. Initial reuse training for the Reuse Center's staff;
- (b) The EA staff will:
1. Provide each Reuse Center with centralized reuse assistance, guidance, support materials, additional training and operational procedures;
 2. Coordinate Reuse Center domain analysis activities. This will provide a consolidated view of cross-service reuse opportunities and will help pinpoint specific donors and recipients of key reusable components (e.g. report generators, message handlers, screen generators, etc.);
 3. Coordinate library population activities of the Reuse Centers to maximize sharing, eliminate duplication and ensure consistent component quality;
 4. Provide a periodic Software Warehouse consolidated catalog of components available, to include descriptive information on each component;
 5. Collect, analyze and disseminate metrics and cost avoidance information on CIM reuse activities;
 6. Review and refine reuse policies and procedures;
 7. Develop, maintain and enhance automated reuse support tools, i.e., the Automated Library System (to include network capabilities, compliance with Open Systems Environment, graphical interface, etc.) and an Automated Component Certification System.
- (c) Each Reuse Center will assume a domain specialty to reduce redundancy and will accelerate domain analysis activities to select an initial set of supported projects and identify the categories of reusable components required by those projects;
- (d) Reuse Center staff will begin to work with supported service projects to provide reuse training and incorporate reuse concepts into all stages of software development life cycle;

- (e) Each Reuse Center will begin additional population of its RCL under the central coordination and oversight of the EA.

PHASE III: Sustainment/Expansion (48 months)

During this phase:

- (a) Domain analysis and library population efforts at initial Reuse Centers will be accelerated to full operational status;
- (b) Additional Reuse Centers will be established;
- (c) Updated and advanced reuse concepts, procedures and tools will be developed and implemented;
- (e) EA coordination and guidance activities will continue.

SECTION 3 MAJOR PROGRAM TASKS

This section describes seven key CIM Reuse Program support tasks to be performed by the EA.

Task 1: Program Management

The EA will formulate and promulgate reuse policies, standards and procedures and will produce and direct the execution of Reuse Implementation Plans. Activity, cost, contract and schedule management also will be a key function in this area. Additionally, reuse metrics collection and cost & economic analyses will be performed.

Task 2: Program Implementation & Coordination

In addition to the planning activities provided in Task 1, the EA will:

- a. Develop and conduct reuse training for each Reuse Center and its supported projects;
- b. Centrally direct the domain analysis efforts of each Reuse Center to produce consolidated, consistent architectures and identify the most lucrative reuse opportunities;
- c. Establish and operate the Software Warehouse. Centrally direct and manage the population of the Software Warehouse and coordinate the activities of the supporting service Reuse Center libraries (including: configuration management of RSCs; publication of a quarterly RSC catalog; RSC quality assurance, library database maintenance development and dissemination of RSC reusability standards and certification procedures; adjustment and consolidation of the standard RSC classification scheme; collection and analysis of RSC/reuse metrics);
- d. Maintain and enhance Reuse Center automated reuse tools and methodologies.

Task 3: On-Site Reuse Center Support

The EA will establish a fully functioning RAPID Center within each DoD component. The EA will provide on-site guidance and technology transfer to each Reuse Center with three on-site personnel (1 Reuse Engineer, 1 Domain Analyst, and 1 Reuse Planner/Trainer). These reuse experts will assist the center's staff to: maintain and effectively use the site's library tools; select an initial set of supported projects; identify reuse opportunities within and across these projects; coordinate domain analysis results with other services' results to produce consolidated architectures and cross-service reuse opportunities; and certify, in accordance with EA published standards, reusable components for installation into reuse libraries.

Task 4: Establish & Support Additional Reuse Centers

As the program matures, the EA will guide the establishment and support of additional MIS reuse efforts and centers, and also will continue to monitor, assist and integrate reuse activities in non-MIS domains (e.g., Command and Control; Avionics; etc.) to ensure that the greatest possible degree of DoD software sharing and reuse occurs.

Task 5: Reuse Studies & Analyses.

The EA will undertake a series of directed, short-term studies and analyses focused on making steady incremental, evolutionary improvements to the program's reuse technology and implementation techniques. Sample topics are: improved classification and retrieval techniques; optimum library system configuration to provide widest, quickest access to components; evolution to the Open Systems Environment; standard interfaces with other repositories and a standard representation for reusable components in those repositories (Close coordination with the STARS Program Reuse Interoperability Group will assist progress in this area); integration with I-CASE toolsets; etc.

Task 6: Reuse Tools Enhancements

The EA will continue to maintain the existing RAPID Center Library (RCL) automated system and will undertake a series of rapid prototyping efforts to further refine the functionality, connectivity and accessibility of the library tool. Items such as an AI front-end, robust graphics, and a more flexible

classification and retrieval feature capability will be emphasized. Additionally, automated tools to support component certification and domain analysis efforts will be developed.

Task 7: Reuse Program Coordination

The EA will monitor and interact with DoD, federal government and private sector reuse programs and initiatives to ensure advances and successes are shared and incorporated into the overall DoD Reuse Program. Participation in conferences, reuse working groups and other forums will be used to ensure the maximum advantage is taken of other organizations' successes. Coordination with universities also will be emphasized.

SECTION 4
ORGANIZATION CHART & KEY FUNCTIONS
EXECUTIVE AGENT AND SERVICE REUSE CENTERS

Figure 4 depicts the organization of the DoD Executive Agent for Reuse staff and provides a brief description of the responsibilities of each staff element.

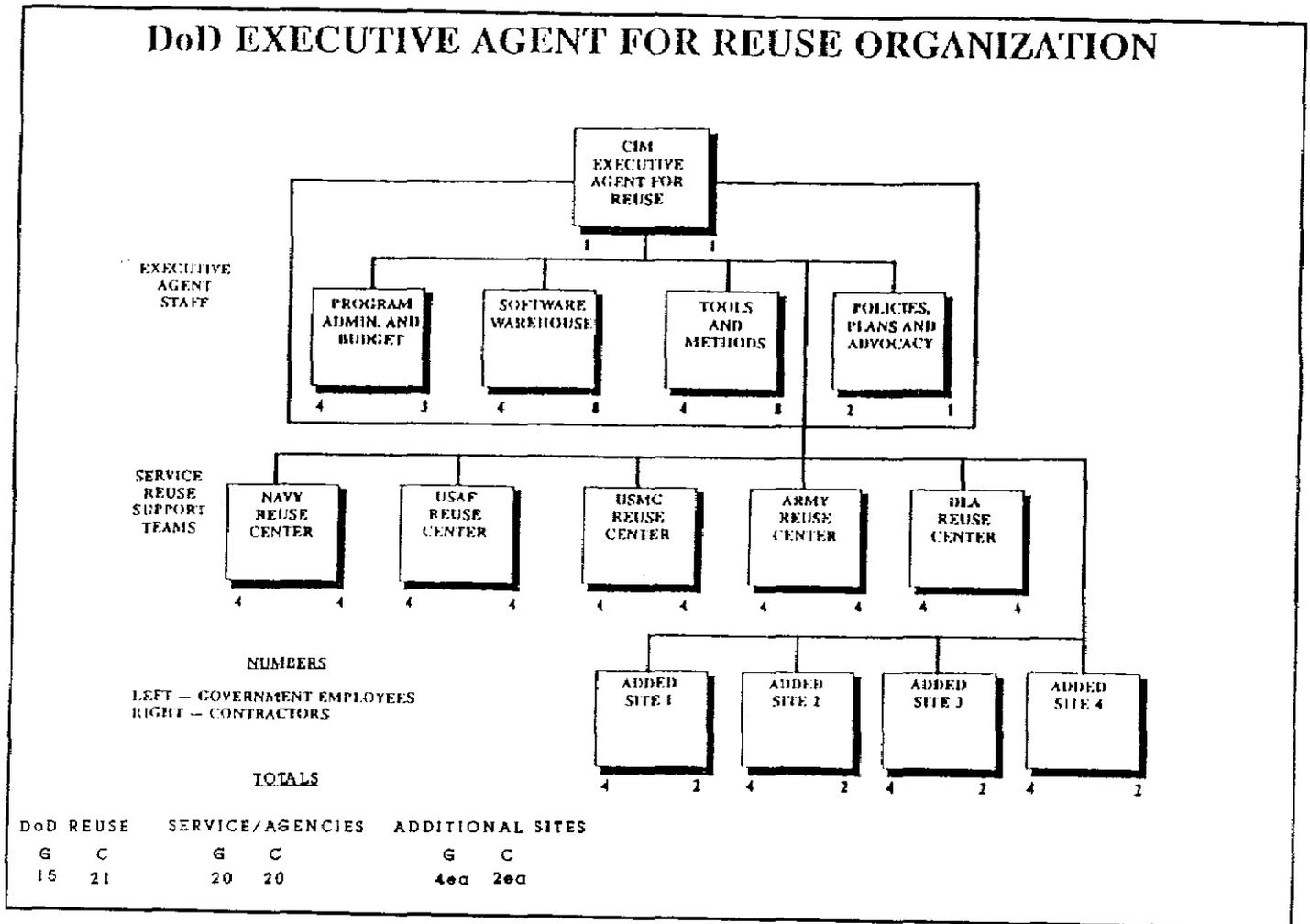


Figure 4. DoD Executive Agent for Reuse Organization.

Primary responsibilities of the Executive Agent Staff Elements are as follows:

- A. **Program Administration & Budget:** This element is responsible for budget preparation and budget management;

contract management; personnel management and administration; clerical and technical publications support. The contractor section of this element is responsible for the collection and dissemination of reuse metrics information and the support of reuse program cost and economic analyses.

- B. **Software Warehouse:** This element is responsible for the System Administration, Data Base Administration, Quality Assurance, and Configuration Management of the Software Warehouse Library and its reusable contents. It is also responsible for overseeing the Certification of reusable components stored in the Software Warehouse and service libraries, and for the direction and coordination of the program's Domain Analysis efforts. This element also directs the development, refinement and presentation of reuse training.
- C. **Tools & Methods:** This element is responsible for the maintenance, enhancement and evolution of reuse support tools, primarily, the automated reuse library system and an automated component certification system. This element will be responsible for designing and implementing network access to the Software Warehouse Reuse Library and for bringing all reuse support tools into compliance with the Open Systems Environment. This element also will recommend and implement improved classification and retrieval schemes for reusable components.
- D. **Policies, Plans & Advocacy:** This element is responsible for the development, refinement, coordination and dissemination of reuse guidelines and procedures. This element is further responsible for fostering the development of reuse standards (e.g., library interfaces, consistent definitions of reuse components, etc.) through participation on reuse working groups and committees (especially the STARS Program RIG). This element directly supports the CIM Reuse Working Group.
- E. **Service Reuse Support Teams:** These teams of four contractor personnel each work with service and DLA Reuse Centers to assist and guide Domain Analysis efforts, Component Certification efforts, and Reuse Planning, Implementation and Training. They are the primary interface for the service centers with the Software Warehouse and its staff of experts/coordinators.

MILESTONE CHART NOTES

NOTE 1: Sites to be installed are: Software Warehouse; Army; Navy; Air Force; Marines; and DLA. Army, Navy and Air Force sites are already in place.

NOTE 2: Functionality upgrades to the library system will be pursued on a continuing basis and will include areas such as: classification scheme; graphics interfaces; retrieval methods; OSE compliance; LAN/WAN implementations, etc.

In addition to the activities cited above, a number of key reuse activities will occur on a continuing basis throughout the program's duration, to include:

- Certification and installation of reusable components into library
- Review and refinement of reuse methods and concepts
- Reuse training
- Coordination with other reuse efforts
- Adding new Software Warehouse subscribers
- Mapping application architectures to higher level generic architectures
- Develop fee-for-service operations in Centers

**SECTION 6
REQUIRED RESOURCES**

A. OMA FUNDING

(1) PERSONNEL

TASK	YR 1		YR 2		YR 3		YR 4		YR 5	
	FY92	FY93	FY93	FY94	FY94	FY95	FY95	FY96	FY96	
#1 PROG MGT	5	3	5	3	5	3	5	3	5	3
#2 PROG IMPL (EA FUNCTION)	4	8	4	8	4	10	4	10	4	10
#3 REUSE CTRS										
ARMY	4	4	4	4	-	4	-	4	-	4
NAVY	4	4	4	4	-	4	-	4	-	4
AIR FORCE	4	4	4	4	-	4	-	4	-	4
MARINES	4	4	4	4	-	4	-	4	-	4
DLA	4	4	4	4	-	4	-	4	-	4
#4 ADDITIONAL SITES/PRJ SUPPORT	1	2	1	4	1	6	1	8	1	8
#5 REUSE STUDIES	2	3	2	3	2	3	2	3	2	3
#6 TOOLS ENHNCMNT	3	6	3	6	3	6	3	6	3	6
#7 REUSE ADVOCACY	1	1	1	1	1	1	1	1	1	1
Total MYs	36	43	36	45	36	49	36	51	36	51

PERSONNEL
COST(,000) 2520/4730 2646/5198 2778/5943 2917/6494 3063/6819

NOTE: Service and DLA sites' government and contractor personnel will be centrally funded. The services and DLA will provide supplementary funding to support any internal reuse initiatives, including additional contractor funding. However, "Fee for Service" funding will be instituted for the entire program in three phases beginning in FY92.

Personnel costs were computed at the following rates:
 (G Employee = \$70k per ManYear) (C Employee = \$110kper ManYear)
 *5% Inflation added to years 2-5 for both labor categories

(2) TRAVEL & MATERIAL: (FURNITURE, PC's and SYSTEM S/W LICENSES):

	YR 1 FY92	YR 2 FY93	YR 3 FY94	YR 4 FY95	YR 5 FY96
Cost (\$,000)	\$550k	350	850	250	250

(3) FACILITIES: (\$20.00 per SF including utilities)

	YR 1 FY92	YR 2 FY93	YR 3 FY94	YR 4 FY95	YR 5 FY96
Cost (\$,000)	\$120k	120	120	120	120

TOTAL OMA (\$M)	7.92	8.31	9.69	9.78	10.25
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B. OPA FUNDING

	YR 1 FY92	YR 2 FY93	YR 3 FY94	YR 4 FY95	YR 5 FY96
Cost (\$,000)					
EA DEVEL ENVIR.	\$400k	300	350	200	200
EA S/W WAREHOUSE	300	400	500	200	200
SERVICE SITES	150	640	150	640	150
TOTAL OPA (\$M)	.85	1.34	1.00	1.04	.55

TOTAL FUNDS REQUIRED (\$M)	8.77	9.65	10.69	10.82	10.8
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TOTAL PROGRAM = \$ 50.73M over 5 years